

Message

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Sent: 1/30/2019 1:26:25 PM
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Subject: STICS: Clearance Initiation: #ORD-028439: Life Cycle and Cost Assessments of Atmospheric Water Generation Technologies and Alternative Potable Water Emergency Response Options - Report

This e-mail is to inform you that you have been copied on the following Safe and Sustainable Water Resources clearance submission in STICS:

- **Product type, subtype:** Reports and Guidance, Report
- **Product title:** Life Cycle and Cost Assessments of Atmospheric Water Generation Technologies and Alternative Potable Water Emergency Response Options - Report
- **Author(s):** Absar, M.S. Cashman, X. Ma, J. Garland and M. Jahne
- **Initiator:** Cissy Ma, ord/nrmrl/wsd/dwsb
- **ORD Tracking Number:** Tracking # ORD-028439
- **Impact / Purpose Statement:** AW with minimal treatment may be a cost effective alternative for bottled water and/or potable use in areas where small scale water generation from local sources of water would be ineffective or relatively expensive. This study assessed the costs and energy impacts for the AWG system based on the method used to condense the atmospheric humidity and extent of treatment required for potential application of the condensate.
- **Product Description / Abstract:** There are several ways to provide potable water to the community in times of an emergency. In recent disaster events, bottled water has generally been provided to the affected population. However, some new products have come on the market that can generate water from the atmosphere and may be an effective alternative to bottled water in times of emergencies. These

products are known as atmospheric water generators (AWGs). This research uses life cycle assessment (LCA) to evaluate the potential environmental impacts associated with the bottled water system and the AWG system based on a suite of environmental indicators. A companion cost analysis is also conducted using net present value calculations. The project evaluates bottled water systems associated with a single-serve 16.9 oz bottle served in 24 pack cases and multi-serve 5-gallon reusable jugs, in addition to two brands of AWGs designed to operate at multiple scales, manufactured by Watergen and Ecolobue, respectively. Life cycle inventory data were collected from vendor-provided data and published peer reviewed literature to be modeled in openLCA v1.7.0. Several sensitivity analyses were conducted to quantify the effect on results of single-serve bottle weights, transportation distance in delivering multi-serve jugs, source of water for filling the bottles, recycled content and recycling allocation methods in bottled water systems, electrical grid mixes for AWGs, volume of water produced by AWGs and the method used to wash the reusable container for drinking water either from the multi-serve jug or the AWGs. Results indicate that the AWGs typically have higher impacts across all environmental impact categories as compared to the bottled water systems. The multi-serve reusable jug has the lowest impacts across the environmental impact categories of all the systems studied. The impacts of the multi-serve jug can be further reduced by lowering the transportation distance to and from the user. The operational life cycle stage of the AWGs has the highest impacts across all impact categories due to the energy requirements of the system. LCA impacts for the AWG may be reduced through utilization of low environmental impact electrical energy options. While AWG units have substantial upfront capital costs, cost results are lower for the AWG unit compared to bottled water options purchased from commercial locations when amortized over the AWG's lifetime.

- **Tracking and Planning**
 - Task ID: SSWR6.03A
 - Task: Systems Approaches for Assessment of Water Reuse
 - Product Title: N/A - Not Applicable
 - Product Description: N/A - Not Applicable
 - Project: Transformative Approaches and Technologies for Water Systems
 - Topic: Water Systems
 - Research Program Area: Safe and Sustainable Water Resources

- **Product Category:** Does not require Advance Notification
- **QA form attached in STICS?:** Yes
- **QAPP Reference:** G-WSD-0031633-QP-1-0
- **Keywords:**
 - Atmospheric water generators (AWG)
 - Alternative water source
 - Bottled water systems
 - LCA

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